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The presentation by Alan C. Green briefly discusses the activities and concerns of EFL and elaborates on the learning environment of the 1970's. Building programming is discussed along with the need to consider--(1) time utilization, (2) architect's early involvement in the process of building programming, (3) prevention of domination over the team, (4) program for the future, (5) research, and (6) careful communication. Five major discoveries made in the last few years are described--(1) the 24' by 32' classroom is not the only viable setting for education, (2) the most important person in education is the individual student, (3) education is not static, (4) instructional technology has a very important role to play in the educational plant, and (5) most people live in cities and most education takes place there. Significant developments in educational environment are dealt with including large and small group instructional space, common areas, classroom design, facility suites, vocational education facilities, special educational environment, modular scheduling, library innovations, information availability, instructional aids, resource centers, mix of facilities, open plan schools, school renovation, furniture design, and construction systems. (RK)

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THE 1970'S

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By

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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ERIC Clearinghouse on Educational Facilities
The University of Wisconsin
Madison, Wisconsin

March, 1969

FOREWORD

An invitational conference was held in early July, 1968 at the University of Wisconsin. The theme of the conference was Environment For Learning.

This paper was presented at the opening session of the conference. The transcription of that presentation is contained herein. It is a statement which will be of value to educational leaders, design specialists, and students of the subject.

The ERIC Clearinghouse on Educational Facilities (ERIC/CEF) was a sponsor of the conference, as were several educational associations and agencies. ERIC/CEF is a clearinghouse of information about sites, buildings, and equipment used for educational purposes; included are the efficiency and effectiveness of activities such as planning, financing, constructing, renovating, maintaining, operating, insuring, utilizing, and evaluating educational facilities.

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Howard E. Wakefield,
Director

March, 1969

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ENVIRONMENT FOR LEARNING: THE 1970's

Alan Green, Director
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Introduction: Professor Stewart D. North

There is no reason why we should spend time on Mr. Green's competence and interests in the environment for learning as his work is known. However, I think that when we share ideas or bump heads with a person on controversial ideas, we should know a little bit about his background and from whence his biases come. His educational background is that which we term a design specialists. He is a graduate architect from the Rensselaer Polytechnic Institute. He has had a varied and rich professional career. Some high points are being professor of architecture, consultant to various firms, and finally moving through a number of responsibilities with EFL to the post he now fills so capably. He brings to us a wealth of experience, knowledge, and ideas. It is my pleasure to introduce Mr. Alan Green.

Mr. Green:

Dr. North, I want to thank you for not using the term "keynote address," because when I learned that I was scheduled to kick off this conference I was a little appalled. When I think of the keynote address of a national conference, it is far too lofty. I think much more in terms of "let us talk together" this afternoon about ENVIRONMENT FOR LEARNING, 1970; I will keep it informal and hopefully that will stimulate interaction as we draw to the close.

As Dr. North mentioned, my professional training is in architecture. I am now deeply immersed in education which is certainly the most interesting, fascinating, and complex area of our society today. I am trying, together with the Educational Facilities Laboratories to be of assistance to and have impact on these prime movers in the development of educational facilities. I am doing this through the medium of philanthropy.

Let me just take a minute to point out some activities and interests of EFL as it may be of interest to you. So that there will be no misconceptions of what Educational Facilities Laboratories does or does not do let me discuss what we are all about, what we are trying to do, and how we go about it.

About 10 years ago the Ford Foundation decided that in the field of philanthropy one of the approaches that they could take toward examining specialized areas of concern would be in the creation of inde-

pendent agencies funded by the Ford Foundation. A number of these were created: The Council on Library Resources in Washington, the Fund for the Advancement of Education, and the Educational Facilities Laboratories. We are an independent foundation, and it just so happens that our sole source of support is the Ford Foundation. We are charged with being near at the right time with a little bit of assistance or whatever is necessary to help people make a difference in the development of educational facilities.

We are concerned with the physical aspects of education: with plant, with site, with buildings, with furniture, equipment and the like, the hard things of education. We do this through a program of grants. We have some funds available to colleges and universities, school districts, associations, and other non-profit organizations to study, investigate, explore, research, and to bring professional services to workshops, to do whatever is necessary to try and take a step forward in the whole art and science of creating the educational environment. We do this by a program of grants, and making consultants available to various groups. We also do it through a dissemination program.

For example, if we have sponsored or funded the planning of half-a-dozen middle schools in various locations and in various configurations, maybe the time then comes to put out a report on the middle schools (which by the way we have done). Then, probably, we will not do a great deal more on the middle school area. This is the extent to which we can go in that area. We then turn our attention to other fields and concerns. This is the way the Educational Facilities Laboratories works. There are a number of reports available; if you did not receive them and you are not on the mailing list, we would be happy to distribute those requested at, of course, no charge.

As said in the beginning, I think most days I feel that I have one of the most interesting jobs, and some of my days end in total and complete frustration. Let me just bring to you a few of the things I have been concerned with over the last couple of weeks.

A school district in up-state New York came in. They happen to have a "donut" plan school. Remember, back in the early 1940's or early 1950's, there seemed to be some merit to building round, circular schools with a nice hole in the middle? The idea being that we reduced student traffic and congestion with a nice compact plan. They have a two story elementary school with about 8000 square feet of space in the center of the donut. This was a completely open space with circular corridors looking down into it.

This particular district has been having trouble passing bond issues. One of the things that the skeptics in the community keep pointing to is that 8000 square feet of what they now call "wasted space" in the middle of the school. Of course it was originally envisioned as a great outdoor recreation area, laboratory, etc., but it is now neatly mown grass and that is all. What we are going to try to do is

to bring to this district the professional talent which will find a way to dome the 8000 square feet of circular space in the center with one of these nice, light-weight, geodesic type domes which will not require additional structure. Hopefully, we can take what will then become interior space, reorganize it for the resource center, and practically turn the school into itself. It will make possible a great "living room" in which to introduce all types of instructional materials on an individual basis and bring a new aura to the educational processes and the educational feeling of that school.

Another example: a young French architect came into the office a few days ago with a very interesting structural system to create a very handsome and very economical space enclosure, a nice, simple shelter. We helped him get in contact with a manufacturer of plastic materials which can be formed as a kind of blanket. After the plastic is exposed to the sun a while it cures and becomes hard. You may begin to create some of these very inexpensive little space enclosures at $1 - $1.50 per square foot which can be used to cover play areas, create simple exhibition areas, to extend the use of the school playground, and to permit outdoor space to become a year-round resource to the community as well as the school.

Another example: an architect, who over the last couple of years has had several hundred thousand dollars of research money from the Federal government (this money came under the low income experimental housing section) has been developing a computer-based system for "costing out" decisions during the design and planning process. This young architect happens to be located in North Carolina where there is a great data bank on the cost of construction, the cost of materials, the costs of labor, equipment, etc., for construction in that region. The notion is that as you make decisions during the design process as you move, for instance, from a single story, loft plan to multi-story, from one type of material to another type of material for exterior walls, from one structure system to another, you can test the impact of these decisions in terms of ultimate costs. Rather than proceeding as we do now waiting until the design is pretty well finished and estimated or bid, we can now begin to get a sense of the effect of our decisions in terms of cost during the design and planning process. We are trying now to find a way to make the potential of that system (and we don't have a couple of hundred thousand dollars to put into research and development) available to the planning of schools. We are trying to get other architects involved with this young man, get them on the equipment, and test cost decisions during school planning.

We had a group of parents in from Harlem the other day. This is a group of parents who had organized themselves into the Harlem Montessori Association. They run preschool centers in Harlem and are looking for old brown-stones in the Harlem area. They want to fix these up to create Montessori "Head-start" type programs. We tried to find some assistance for feasibility studies on these various brown-stones that they want to pick up in the Harlem area and convert for preschool centers. Of course, at the same time they are also going through the whole process, in small but very significant ways, of the rehabilitation of neighborhoods.

A superintendent came in the other day who is planning a new middle school. He is very imbued with the notion of open plans. He likes the thought of the responsiveness of this kind of space - the possibility that lots of things can happen in this space, and that it can be constantly reorganized and reordered. He was a little desperate, because he really has not found the furniture to make the open plan work. As you know, we have quite a few open plan schools around the country which are basically a series of conventional classrooms because the furniture is so immobile and so weighty. It just sits there loaded down with equipment and books. You cannot shift it around very easily to reorganize the space. We are trying to get him together with some local manufacturers of equipment and cabinet work to see if they can bring out a new line of products: mobile, portable, and quickly moved about display services, tackboards, chalkboards, cabinets, etc., that can begin to make the open plan school work a little more effectively.

As another example, we had some architects in from one of the large cities on the Eastern seaboard. They have a whole new city administration, a superintendent of schools, and a new school board assuming leadership at one time. Some things are going to happen in this big city. For once the architects want to be organized, mobilized and ready to help the city achieve a building program of elementary school replacement. For years the politicos have gone outside the city or to the same firm of architects who have always done work for the city. Now, they can perhaps organize the architects in that community as an architectural consortium. They may be able to not only do a very good job on these forty elementary schools to be built in the next few years in this community, but in turn mount a research effort and a very extensive program effort to bring the finest in resources, talent, and effort to the creation of schools. What can we do to help them gain from the experience of other consortiums or organizations and bring some coordination to the planning and design of schools in big cities?

From the large scale activities we come then to less dramatic but equally important issues such as the problem of three social studies teachers from one of our neighboring communities outside New York City. The three social studies teachers had been laboring on a committee for some three years to create a coordinated, social studies curriculum for the school system (K through 12) in this particular city. They have now reached a point where they have the curriculum and know where they want to go, but the facilities in their existing high schools would not allow them to implement this curriculum as there was no space for a resource center-type facility. They came in to see if we could provide some assistance to bring consultants and design specialists to help them. They are going to tear down the intervening wall and are going to gain space where they can create a resource center where students can come and work independently, very closely associated with

s t a ff, and vast resources. This space will become the hub or focus for implementing this new curriculum in social studies. The hope is that by doing this they will "light the spark" in this school and encourage others to move in similar directions in curriculum revision and the development of facilities. This is the kind of grass roots effort which I think is particularly exciting, and one which we try to assist.

The educcational field has just been discovered as a vast market. Recently the American Management Association sent an announcement of a seminar which they were sponsoring for marketing specialists and related staff. The notion was "come to this seminar and you will learn how to tap the educational market." All of a sudden in the last few years they realize the fantastic volume of goods, services, and materials that the educational market represents to American industry. What we have to do is find ways to communicate educational needs in terms of equipment, materials, etc. We had a manufacturer come in recently with this problem. This manufacturer's idea was a transistorized, portable microfilm reader. We tried to help him learn of the needs and the value of his solution to those needs.

These are some of the things that we try to do and some of our concerns. I think this conference and hundreds like it, meetings, visits, working with educators and architects, looking, and reading are the pieces of the mosaic. When you begin to put them together, you get a pretty good picture of the issues and the raw nerve ends in American education today. You hope to bring some solutions and resolutions to these types of problems, and you begin to see the directions for educational environments in the 1970's.

One point that we recognize today is that the educational environment of 1970 is now being programmed. Each of you at the local level has begun to define the need for educational facilities for the 1970's. Today, the things you are thinking, the things you are acting upon, the decisions you are making in terms of facilities are really setting the stage and are going to determine the educational environment for 1970 and the new century.

All of this points up once again the very important art and science of building programming. I assume this is a term that you use. To me the definition of building needs, and the determination of the performance that you desire for the facility are the critical stages in the whole design-planning process which finally evolves in educational facilities.

In this process it is not unusual for educators to say to architects, "Why don't you people give us a school that we really want?" and architects do just as emphatically turn to educators and say, "Why don't you tell us what you really want?" Therein lies the problem and the hope: the communication process between architects and educators. The medium to me is the educational specification, the building program.

What I would like to say now is pertinent to the whole process

of the building programming. Please give careful consideration to the following:

(1) Give enough time that you can organize, mobilize, bring the right people together, think together, work together, and develop the educational specifications for the building program that is going to meet your educational needs in the environment of the 1970's. Be sure to bring the right people together.

(2) Involve the architect in this process of building programming from the outset whether he takes the major role or not (and more and more architects are taking the major role). You may work through a consultant, or you may work through an in-house organization which handles the programming process. Whatever you do have the architect involved. A lot of good information is lost if you wait to communicate with the architect until the time when we have a spiral bound set of educational specs for the architect and say, "Here, go take it, and design a school!" Immediately he has to go back to determine who made decisions, how decisions were made, why they were made, and what was the genesis of this building program that he sees before him.

(3) Prevent domination by anyone particularly persons who are in a position to curtail the creativities of other members of the team.

(4) Program for the future because we certainly know that what we have today is satisfactory only for today and there will be many, many significant changes forthcoming.

(5) Take time to do research. Collect information, look around, find out who is doing what, etc. One of the most important roles that we try to fulfill at EFL is to make information available to you so that as you begin the programming process you know the current trends and directions. One of our main purposes in life is to provide information to you at this early stage of programming to define the educational environment of the 1970's.

(6) Then, finally, communicate carefully, and clearly to the educational system itself, to the community and, of course, to your architect.

These are a few of the matters for attention. The cautions I would bring to you in the whole process of building programming (and again let me say that I think that the programming process is the critical one) is that the decisions at this early stage are most important and bring more form to the school and to the environment than anything the architect does at a later stage.

I would like to review some of the areas in which we have experienced and learned of some of these bits of the mosaic which made up what is important today.

I would like to organize five major discoveries that we have made in the last few years. These are: First, that the 24' by 32' classroom (there are nice statistics accumulating which show that there are a hundred thousand plus classrooms in America with dimensions of approximately 24' by 32') is not the only viable setting for education. Our school plants are beginning to provide a wealth of learning opportunities through a wide variety of educational facilities within the total complex. The classroom as the common denominator, as the common planning module is con-

stantly losing ground as the basis for planning. Many other kinds of facilities, types of configurations are beginning to take its place. Nationally we are dealing with large spaces, with classrooms of a new nature, with seminar spaces, and facilities for individual students. We are trying to build facilities which respond to the various styles of learning, resources, and backgrounds that students bring to that school. We are concerned with facilities that are undergoing change, and we are constantly, of course, concerned with facilities for special education, vocational-technical education, and for many of the other areas of education and social concerns that now must be brought into the fabric of the school. The classroom as the standard planning-programming module has probably begun to lose its great significance, and we are replacing it in part with a wide variety of environments because of a wide variety of learning opportunities, methods, and techniques which we find within the school plant.

Second is the discovery that the most important person in education is the individual student. By the way, there is a very nice little book out by one of the architectural firms to the effect that the most important number in education is one, the individual student. As we become more and more concerned with this most important person, the individual student, we become concerned about the resources which can be brought to him and to his educational process. We are concerned with the styles of learning which he brings with him. We have finally discovered that not all students are oral, but that lots of kids are visual. That is the way in which they best plug themselves into the educational process.

We are concerned with identity. When a student enters into a physical facility he identifies with it. There are facilities which become a homebase. There are people who are concerned about thim There are people who know where he is at any given time. Facilities should be such that he can identify with the physical side of education.

The interesting thing is that today it does not necessarily mean that we are thinking small scale any more. In Pittsburgh, they are talking about the Great High School effort which will create some five Great High Schools serving the city, each one of which will have enrollments somewhere in the neighborhood of six or seven thousand students. These aren't big high schools; these are small universities. The point is that we are trying to create sub-elements, sub-units (little houses as we all know them) so that a student does not feel that this great seven thousand student high school is his place of education. Rather within the large unit there is a sub-unit which is his place of education. It is scaled something in the neighborhood of several hundred students rather than measured in thousands.

Third is the discovery that education is not static. It is in constant change. It is in constant change generally and in change constantly as far as our own communities, our own neighborhoods are concerned. Whatever we do in education we will not be able today to plan a school building which will be right for the next twenty,

thirty, or forty years. If education is changing, so must the container of education change. As we build, as we plan and build facilities for the 1970's don't forget that they will be in use and house education for the first two decades of the twenty-first century. Probably, from our viewpoint, one of the most significant problems in the whole area of educational facilities is to provide facilities which can accommodate change.

Fourth, we are discovering that instructional technology has a very important role to play in the educational plant; more than TV as a simple distribution system or educational TV as we know it; rather, that instructional technology begins to play some very interesting roles for the individual student small groups, and in a variety of ways throughout the educational process. The interesting point here is the interest of industry. You can just see the gearing up, the organization that industry is taking to begin to tap this educational market.

Fifth, the interesting discovery is that (and we really discovered this a year ago last summer) most of us live in cities and that most of the education takes place in cities. For instance, one out of every thirty-five school children in America goes to school in New York City. New York City is composed of five Burroughs. Within the Burrough of Brooklyn there is an area called Bedford-Styvestant, where there are about the same number of kids as there are in the entire city of Atlanta, Georgia. The scale of the educational problems in our big cities, the problems of bringing dynamic education, and providing facilities for education is one of the great critical problems. To find the new format, the new opportunities, the new organizations that will allow us to bring to the cities some of the great educational opportunities that we have brought to the more affluent suburban, semi-rural areas, and small towns, is a tremendous challenge.

These are five discoveries, five concerns, and I'd like to think with you about some of these things. This cannot really be a 'keynote' address because we are going to look at several slides to emphasize some points. I am one who communicates better visually than orally. Let us think of these five discoveries in terms of providing a variety of settings for education; facilities that respond more and more to that most important individual student. We are providing facilities that are responsive to change. We are providing facilities that accommodate instructional technology in a variety of different ways and at a variety of different levels. Also, we are beginning to think of some new formats, some new approaches to providing the educational environment in the city where so many of us are living. (Slide presentation started)

All of you recognize the Quincy School of 1847, the plan for the first graded school which I understand was quite a revolution in itself in 1847. The classroom we see here became the basic module for planning for the next hundred years. Many other spaces are being substituted for it today providing a wide variety of learning environments. Certainly one is the large group instructional space where, we

have found, there are certain functions in the educational process (particularly the straight giving of information) which might well be conducted in large groups, efficiently and effectively. Let us back the instructor with a variety of instructional materials, resources, and technology so that the process can be just as efficient as possible. The large group instructional space is one of the important variables in the school plant.

We also move all the way to the most individual level in the most informal way. We find places where kids can work in this sort of setting being creative and informal where the environment will permit. Schools may be to a large extent great, carpeted areas where small groups of students will gather in small seminar, interactive groups informally sitting on the carpeted area. In a few minutes, groups may quickly break up and go into larger group activities or into individual instruction.

The seminar, which for so long we thought as only the province of the college and university, is finding its way into the elementary, and particularly the secondary, school; the more formal, small group interactive session where the students exchange, interact, and challenge each other. This is the type of space to allow that sort of thing to happen. Sometimes we do not necessarily have to set aside individual rooms for these sorts of interactive activity, but it can take place in the larger open-plan area or in a large conventional space which has been modified or renovated to accommodate this activity.

We are providing commons areas in the schools. This informal common area also doubles as a study hall, meeting area, and as a lunch room. In this particular instance (this is a middle school) the food service is handled by vending machines. This facility is right in the hub of the school just across from the resource center.

Even within the school plant where we provide the conventional classroom for groupings of thirty students or so, the classroom itself begins to take on some changes. We bring to it instructional technology, new forms, new characters, and new environment. We begin to think of the individual classroom again as a space which can change to accommodate variations in groupings.

Here is a little scheme that was developed a few years ago for a conventional classroom. Through the use of these swinging panels, movable furniture, and equipment, it can quickly be converted to allow small seminars, interactive groups, independent study, etc. Of course it can quickly be converted back to a conventional classroom. Even within restrictions of our so-called conventional classroom, we can begin to provide quite a variety of learning environments.

We are beginning to see, too, the introduction of suites of facilities, a kind of subsystems of facilities, that operate together. For instance, here is a plan for an audio laboratory. Basically, it is what we think of as the language laboratory. It is based on the distribution of audio, playback, and repeat. It is very easy, once you have

an audio system of this sort to use it for languages, history, drama, literature and other areas of the curriculum. Maybe there are times when you don't necessarily work with a large group of students or a conventional group of thirty or thirty-five students. There may be times when an individual student should be working independently while drawing information from the same electronic system. As we get small groups of students interacting together, we begin to see combinations of spaces for large groups, seminars, and independent study all working with a central electronic sound base or information base.

Of course, the whole area of vocational, technical, and occupational education requires a whole new range of facilities. We are about to put out a publication, hopefully within the next few months, which explores five case studies of vocational facilities around the country. One of the case studies is of the regional - technical institute at Kenosha, Wisconsin, which we understand to be one of the finest vocational centers in the country. As we bring the whole opportunity for learning job entry skills into the fabric of the conventional educational system, it brings changes to the middle school. In the Richmond system, we are beginning to think of changes in the elementary school. As we proveide kids with the opportunity to try, to test, to learn through skills of this sort not only does it offer them an entry and a learning technique, but it also provides them some saleable skills.

Of course, there is the very particular problem (and one in which there is very little research, very little known information, and very little experience today) of providing the appropriate educational environment for special education - not only for mentally handicapped kids but for those that may have hearing, sight and other physical disabilities. How do we weave these special kinds of facilities into the format of the conventional existing or proposed high school, elementary school? How do we and when should we create the regional center which pulls all of these special facilities together to serve a large area?

One of the most interesting developments which goes along with providing a variety of educational environments is the way in which we have begun to take a new look at time. After all, there is nothing really sacred about that fifty-minute period which has been the basic module used for organizing the school day and utilizing the school plant. If you take a module of time, say 20 minutes, and you put together as many or as few of these modules of time as appropriate for the learning activity, maybe then we would have a day or a time which is responsive to variations in the required learning activities. Here on the right, you have the modular school day. You can see that, for instance, a large group instructional situation may really be appropriate for only twenty minutes. This may be the maximum length of time in which that sort of high-powered, informational session can persist. Maybe seminars should be four modules of time, perhaps 80 minutes long, depending on the subject, the age of the kids, their point in the curriculum, etc. Laboratories should perhaps be many modules of time placed together so that students can get on with research projects and self-

study. If we begin to think of the school day arranged on the modular basis and organized to meet the variations in learning opportunities, we can then begin to have a time system which allows us to put to work effectively variations in facilities. I promised myself today that I would not talk about computers, but, after all, it is the computer which we have available and which allows us to schedule time efficiently, such complex scheduling of time as we see here with the modular approach.

I think it is interesting to see some of the changes that have been brought to the library, to the learning resource center, to the instructional materials center. Here we do everything in the world we can to entice students to read, discover, work, and learn through a process of personal discovering. The most exciting part of all of this is the way our libraries and resource centers are being opened up and made an integral part of the school plant. They are now the place to which kids want to go and will go whenever they have the time and whenever the chance affords itself.

Not only are we gearing the printed word more to the individual student, we are making it more available to him. Information in slide film and tape form is becoming readily accessible to the individual student. Some of our dial-access systems which have caught on are based on this notion that the availability of information should be responsive to individual students so that when you come to the center and are ready to proceed with a given area of search, information, and instruction, you dial the information that is needed, work with it, and when you are completed, move on to the next area of information constantly calling it up at your pace, speed, and rate of interest. This is the basis of the dial-access systems we see illustrated here.

One of the really fascinating developments that we are seeing now (which I think has great significance for the facilities of the 70's) is the development of portable, miniaturized, personalized, instructional technology projectors, recorders, play-backs, readers, and all sorts of equipment that the individual student can check out and take to the carrel. He can take it wherever he can work with it.

The resource center can provide a variety of ways in which a student works with information as well as providing a great variety of information. It isn't a well-defined area which is set up as a specialized area off to one side of the school, but rather it is the very heart of the school. A great variety of the facilities are provided within the resource center. We have everything here from tables and chairs, carrels, soft reading areas, typing room, to rooms for small groups of students to get together and work with audio-visual materials. A great variety of materials and a great variety of ways to work with them seem to me to be the key to the resource center of today and tomorrow.

As we begin to think of facilities which are responsive to the individual student, as we begin to think of a student with an identity, it begins to cast the teacher in new roles. Certainly we need to pro-

vide a home base for the teacher outside the conventional classroom, a place for him to work, study, organize material and meet students. There are some people who are beginning to think that the place for faculty offices, teacher centers, and the like is in the resource center. After all they themselves become a certain resource, a guide, and director of the use of all other resources.

Not only are we thinking of schools which are responsive to students in terms of providing physical resources and information materials and people who respond to them individually, but we begin to see some school plants that do this sort of thing where the pod or sub-unit becomes the focus for a student rather than this entire complex of facilities, where he identifies with that grouping of two or three hundred students rather than with the grouping of fifteen hundred or two thousand students. This is his point of contact with his entire school plant. Scale and identity become so very controversial.

You would all probably agree that one of the most controversial and persistent problems is the question of how we provide facilities which are responsive to change. We know education is changing, we know that the container of education must change, but how do we go about providing a plant that can change? Certainly all of us have looked at the question of the folding partition. That is one way to go about it as this little model illustrates. By a couple of folding partitions, you can create either large group spaces which can then be divided into conventional size spaces, or even small seminar or individual study areas. That is one way to possibly go about it.

There is another way to go about providing facilities which will allow change without rendering the facilities themselves obsolete, that is to provide a great mix of facilities rather than providing only one size and type facility. Why not have large spaces, medium spaces, independent study areas, etc., to provide a great mix? As educational processes change, you may still have the mix of facilities which will allow the school to remain viable through variation in the way in which you schedule these facilities. The providing of a mix of facilities may be another way to allow for change in the 1970's.

One of the other ways in which we are doing today is the creation of the open plan school. This is an elementary school (in New York City) which is basically a large dome with great carpeted areas for the classroom space. Groupings are defined by the way in which the furniture and equipment are arranged and constituted throughout the open space. Again, we go back to the problem of providing the furniture and equipment which will be as responsive and as changeable as you would like it to be in order to make the open plan school work. One way is to provide large, open expanses of space, space which then allows for quick rearrangement, accommodation of change both day by day and over the years.

Of course, within our existing school plants we can make change. We can accommodate change through processes of remodeling, renovation, and updating. This is a scheme for the renovation of two conventional classrooms. By tearing out the intermediate wall we create seminar spaces, independent study and project areas, and a couple of facilities adaptable to modern instructional technology.

We can even provide for change by getting down to the details of how we design and create furniture. This happens to be an experimental school in New Jersey where we brought a group of industrial engineers to create a better study carrel. This carrel is made of components or parts which can be disassembled. The kids can take it apart, and they can reorganize it so that you have either sit-down carrels, stand-up carrels, or carrels for seminar areas. Furniture itself can be responsive to change.

There may be other ways of bringing some of the great forces and great strength of industrialization to the building process. I am sure all of you have at one time or another gone to a construction site and watched the process of construction, the way we build today. We take block, bricks, two-by-fours, nails, mortar and plaster, and we slowly build them up, put them together basically in the handcraft approach to create our schools, our houses, and our other dwellings. In a lot of ways the process hasn't changed for centuries. I have been told that with very little training the medieval craftsman could come on to the conventional construction site today and soon be pulling his weight in labor. Maybe, there are some ways that we can bring the industrialization that we see in other areas of our society to the process of creating structures, particularly schools, and at the same time create facilities which are more adaptable, more responsive to change.

This was the genesis of the School Construction System Development Project in California which some of you have heard about. The notion in California was that by putting together enough schools they could guarantee a market which would get American industry to respond with new products for school construction. Not only to just respond with new products, but to respond with products or construction components that would be compatible and together through interlock devices create building systems. If we have building systems made up of industrialized components, it may well be then that we could take away components, add new components, interchange parts, etc. School plants might perform more like our television sets or automobiles where we can constantly take away and add parts and pieces.

In California, a group of schools created a consortium to guarantee a market, a dollar market, for the new products that industry was going to produce. Rather than say to design a partition system, or design a structural system, or design a something else, the people in California said, "We are not going to tell you what we want in terms of a product, rather, we are going to tell

you what we want the products to do. We are going to say it in terms of performance." They then set out a whole series of performance criteria. For instance, in California, this particular group of schools which came together in the consortium felt that they wanted a minimum of 7200 square feet of column-free space. They said that if they wanted to divide that space in a lot of different ways with a folding or operable partition no more than 25 lbs. pressure (which a classroom teacher can provide on a partition) should be required to open and close the partition. Rather than saying what the partition is, or the locking device is, or the tracking system, or anything else is, they put out some performance as to what that partition should provide. It went on in the whole area of light environment, air conditioning, heating, color, space division, etc. They set a great series of performance specifications which they wanted industry to respond to by creating new products.

These are four basic components that industry in California created for those public schools. The one in the olive color is a structural system. It is very simply a structural umbrella which was made by Inland Steel Products, a leader in this particular field. Then in red you see a ceiling lighting and air handling system which is compatible in that it snaps into that structural system. Then you see in the blue-gray a heating-ventilating and air conditioning system which is a roof-mounted unit. This feeds through flexible tubing and is then compatible with that red ceiling system, because the ceiling system becomes the defuser, the outlet for the heated or cooled air supplied by that flexible duct from that package on top of the roof. You have three compatible components together forming great areas of space with complete lighting and climate control. The fourth becomes the space division system. In any four inch unit of space you can construct a partition. It can be a demountable partition. It can be a partition that opens and closes. You can add a partition or take it away. The lighting, heating, air-conditioning, and the ceiling systems respond as you change the organization of that space.

It works something like this. The structural system which has been made in the factory arrives on the school site in a folded condition such as this. It is dropped into place as the roof deck unfolds. Under the roof deck you begin to snap into place the ceiling, lighting, air-conditioning and defuser system. You drop on the roof deck this package, which contains the heating, air-conditioning system feeding into that flexible duct system. You begin to erect the partitions where you want them. You end up in the first instance with a pilot structure that looks like this. This was the basis on which they tested all of the performance to see if the manufacturer had really achieved the acoustical, climate, and total performance criteria that had been spelled out. Then you go ahead and begin to build a school using these components.

Over the course of the summer partitions can be reorganized, relocated, and a whole wing of the school can be completely changed if so needed by educational processes. I think the important thing

here is that once you open the school and work in it, you can determine the acoustical privacy needed. You come in over the weekend, and put in a new wall here or there. If you find that some walls are interfering, or the teachers are not getting together enough, that there is not enough cooperation, enough coordinated teaching and planning together, some walls can come down. This really is a sort of responsiveness that they were trying to build into the California system of school construction.

We have a whole new family of instructional technology which allows some of the open plans to work that have not worked before. You pull it out, a unit, click on the projector, gather the kids around, and away you go without necessarily having to dim the lights and have a blackened environment. We are beginning to get things that work better and better in the open plan schools. We are beginning to let kids themselves think about what instructional technology is, and what it means to them, beginning to think of instructional technology in terms of systems. As we begin to use television as a distribution system for individual students, we also can begin to think of it as a distribution system of information for large groups of students. We saw this possibility in the dial-access carrel shown a few minutes ago. The same information available to the individual student working here is also available in the classroom to a large group of students at the call of the instructor. We are now thinking of instruction technology in the terms of systems of communication with various outputs depending on the instructional technique deemed most appropriate.

Then finally is the problem for so many of us, the educational processes and configurations in the city. A proposed solution for Brooklyn is the linear city. Where land is so expensive the problems of building are so great that maybe we can begin to string education (as they call this in the linear city) along the air rights, through-ways, and the Long Island railroad. The educational facilities reach out into the community at many points. The school, traditionally an edifice that rises in the middle of the block surrounded by blacktop and a chain-link fence, perhaps is more accessible as a string facility winding itself into the community and becoming a much more integral part of the community.

There are some things that we can certainly do with the big, old, inner-city schools. There is a program now underway through the Research Council of Great Cities to bring new life to old schools. We are trying to update old environments and bring them up to par as far as instructional environment is concerned.

In our cities there is constantly the problem of changing, shifting populations. The school which was overpopulated, overburdened a few years ago is now under utilized. To compensate for this is the development of flown-in components of space which can be added somewhere else at a later date. These aren't just movable, portable classrooms but rather they are more sophisticated volumes of space. We are beginning to get the technology which

will allow us to make the individual school within the city constantly more responsive to the changing needs of population.

The school site, itself, becomes more of a community resource. We are beginning to find this true even in places like New York. School sites are becoming jointly owned, occupied, run, and maintained by the schools, recreation department, park commission, and the museum. Agencies are coordinating and working together in trying to develop school sites which become much more a community asset and community resource than simply something that operates from 8:30 in the morning to 3 o'clock in the afternoon.

Here is an example of the sort of action that can happen for relatively few dollars. We can enclose a swimming pool and make the pool a resource which can be used by the community throughout the summer and used by the school throughout the school year. These are the approaches that we are beginning to see more and more in some of our inner cities. The school is one of the key factors, the key means, by which we are bringing new life to some areas of the inner-city.

To me these are some of the significant developments in the educational environment. These are the things that we have seen, and we have experienced. These are the things that go to make up the mosaic of educational facilities. They are the things that many of us are already concerned about. All of us who are beginning to program and plan schools for the 1970's are beginning to think of these things. After all, the 1970's are really here.